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NUMBER 22

Proceedings of The Canadian Phytopathological Society

Twenty-first Session

June 21-24, 1954

MACDONALD COLLEGE
QUE.

Editorial Committee
RUTH M. HORNER
R. S. WILLISON
R. D. TINLINE
D. S. MacLACHLAN

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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL

1953-54

President

P. M. SIMMONDS, Plant Pathology Laboratory, Saskatoon, Sask.

Vice-President

W. C. BROADFOOT, Science Service Laboratory, Lethbridge, Alta.

Secretary-Treasurer

A. J. SKOLKO, Botany and Plant Pathology Laboratory, Science Service, Ottawa, Ont.

Councillors

J. C. PERRAULT, Science Service Laboratory, Ste. Anne de la Pocatière, Que.

J. J. MILLER, McMaster University, Hamilton, Ontario.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the Secretary-Treasurer at a price of 50c each.

Front Row : L. to R. — J. G. Coulson, Barbara Tomlin, Mildred Nobles, Jean Newman, P. M. Simmonds, A. J. Skolko, J. L. Townshend, J. P. MacKinnon.
2nd Row : W. F. Hanna, J. H. Craigie, O. A. Olsen, V. R. Wallen, R. C. Russell, G. E. Woolliams, F. L. Drayton, W. A. Hodgson, R. H. Estey, J. E. Campbell.
3rd Row : J. B. Julien, W. G. Benedict, O. T. Page, J. J. Miller, W. D. MacClement, L. T. Richardson. R. Paquin, R. Crete, C. O. Gourley.
4th Row : R. J. Baylis, L J. Tyler, R. E. Fitzpatrick, L. W. Koch, S. H. F. Chinn, T. Simard, G. C. Chamberlain.
5th Row : J. A. Pires, B. H. MacNeill, R. G. Atkinson, C. D. McKeen, A. T. Bolton, D. S. MacLachlan, M. Weintraub, I. L. Conners, L. Cinq-Mars, R. Ross.
Back Row : R. A. Ludgwig, A. E. Straby, H. Zalasky, G. J. Green, W. E. McKeen, J. T. Slykhuis, J. E. Machacek (back), E. O. Callen, J. F. Hockey.

Annual Meeting, C.P.S., Macdonald College, P.Q., June 21-24, 1954.

MINUTES OF THE TWENTY-FIRST MEETING HELD AT MACDONALD COLLEGE, QUEBEC, JUNE 21 TO 24, 1954

Business Sessions : June 22 and June 23.

The first business session was held in the Agricultural Bldg., Macdonald College, Quebec. The President, Dr. P. M. Simmonds welcomed the members and visitors. He briefly summarized the history of the Society and emphasized the sound position both in the matter of finance and membership. The large number of technical papers on the program was mentioned as a good indication of the interest of the members.

The minutes of the twentieth meeting were adopted as printed in last year's proceedings, on motion of R. A. Ludwig, seconded by I. L. Conners.

The President referred to several items arising out of the minutes which would be dealt with in the committee reports.

The election of the Nominating Committee returned the following: P. M. Simmonds (chairman), J. C. Perrault, A. J. Skolko, C. D. McKeen, R. C. Russell.

By unanimous vote on motion of B. H. MacNeill and J. H. Craigie the following membership applications were approved: W. R. Ashford, E. A. Atwell, Gordon L. Ayre, Pieter J. Bels, Mrs. H. C. Bels-Koning, Eric O. Callen, L. J. Coulombe, Roger Desmarteau, Lucien Dubé, S. G. Fushtey, Edouard Lavallée, J. B. Lebeau, J. P. MacKinnon, R. P. Messum, Gérard Michaud, Léonce Morin, James Munro, Jean E. Newman, Lee A. Paine, Roger Paquin, Réal L. Pelletier, J. A. Pires, Jean Rinquet, John L. Townshend, Harry Zalasky.

The report of the Secretary-Treasurer was adopted on motion of A. J. Skolko and J. F. Hockey. It was moved by R. J. Baylis and J. H. Craigie that the Victory Bond in the value of $500.00 which had matured should be referred to the incoming executive for re-investment in a similar bond of equal value. Carried.

The report of the Custodian of the Library and Records was adopted on motion of G. J. Green and I. L. Conners.

The report of the Editorial Committee was adopted on motion of A. J. Skolko and R. J. Baylis.

The report of the Nominating Committee was read by the President and the election of the slate of officers by acclamation was announced.

The report of the Terminology Committee was adopted on motion of R.A. Ludwig and C.D. McKeen.

The report of the Disease Diagnosis Committee was adopted on motion of A.J. Skolko and O.A. Olsen.

No report was received from the Nomemclature Committee and, as there appeared to be no need to maintain this committee, it was disbanded.

The report of the Publications Committee was adopted on motion of F. L. Drayton and W. F. Hanna.

A short resume of the activities of the Program Committee was presented by J. G. Coulson.

The report of the Representative to the Canadian Society of Microbiologists was adopted on motion of A. J. Skolko and R. A. Ludwig.

In consideration of the possibility that Canada might act as host to the next International Congress on Microbiology, the Canadian Society of Microbiologists

invited the C.P.S. to participate with them in preparations for the Congress. On motion of W. F. Hanna, seconded by F. L. Drayton, the Representative to the C.S.M. was instructed to indicate our interest and general support.

Two representatives of the C.P.S., A. J. Skolko and J. G. Coulson, were appointed to attend a special meeting of the National Council of the A.I.C. to consider the position of affiliate societies of the A.I.C. The representatives were instructed to state that the C.P.S. is not in favour of official affiliation in view of the large number of non-agricultural members in the C.P.S. but express our appreciation of the cordial relationship which now exists between the C.P.S. and the A.I.C.

The report of the Resolutions Committee was approved on motion of J. F. Hockey and G. E. Woolliams.

The President expressed his appreciation of the co-operation he had received from the executive and members and, in the absence of the President-elect, Dr. W. C. Broadfoot, turned the meeting over to the new Vice-President, Dr. W. F. Hanna, for adjournment.

COMMITTEES

Nominating (by election): P. M. Simmonds (retiring president as chairman), J. C. Perrault (past president), A. J. Skolko, C. D. McKeen, R. C. Russell.

Program and Publicity: G. B. Sanford (chairman), A. W. Henry, J. B. Lebeau, M. W. Cormack, J. T. Slykhuis, V. Nordin, D. S. MacLachlan.

Resolutions: J. F. Hockey (chairman), H. N. Racicot, A. A. Hildebrand.

Editorial: Ruth Horner (chairman), R .S. Willison, R. D. Tinline, D. S. MacLachlan.

Terminology: M. F. Welsh (chairman), D. C. Buckland, W. A. F. Hagborg, B. H. MacNeill, H.M. Good, T.C. Vanterpool, R.S. Willison, R.A. Ludwig, W.E. McKeen, C. D. McKeen, D. J. MacLeod, R. Pomerleau, L. E. Tyner, A. W. Henry, A. N. Langford.

Disease Diagnosis: H. W. Mead (chairman), W. E. Sackston, G. B. Sanford, G. C. Chamberlain, D. J. MacLeod, Frances C. Mellor, W. A. Benedict.

Custodian of Library and Records: T. Johnson.

Auditors: Mildred K. Nobles and J. W. Groves.

Representative to the Canadian Society of Microbiologists: A. R. Walker.

Publications: W. F. Hanna (chairman), F. L. Drayton, G. H. Berkeley.

Regional Representatives:

L. C. Callbeck	—	Maritimes
R. Pomerleau	—	Eastern Quebec
L. Cinq-Mars	—	Western Quebec
R. J. Baylis	—	Eastern Ontario
J. J. Miller	—	Western Ontario
W. A. F. Hagborg	—	Manitoba
T. C. Vanterpool	—	Saskatchewan
A. W. Henry	—	Alberta
B. M. Lawson	—	B. C. Mainland
R. E. Foster	—	Vancouver Island

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:

I have the honour of presenting the following report of the Secretary-Treasurer for the fiscal year, ending May 31, 1954.

The 20th annual meeting of the Society was held on the campus of the University of Saskatchewan, Saskatoon, June 22-25, 1953. The C.P.S. Proceedings No. 21, which was issued on Nov. 1, 1953, contains an account of the business sessions and abstracts of 25 papers which were presented. On June 22, a reception and annual dinner was held at the Bessborough Hotel and our guest speaker was Dr. B. W. Currie, Head, Department of Physics, University of Saskatchewan. Dr. Currie's address, entitled "The Ups and Downs of Weather on the Prairies", was subsequently published in the Agricultural Review.

The C.P.S. News appeared in four numbers of volume VI during the year. In addition to reports on the regional group meetings, the News contained two interesting letters from members serving under F.A.O. in distant lands, Dr. Wm. Newton from Ceylon, and Dr. W. J. Cherewick from Malaya. A revised report on "Terminology of Plant Virus Diseases", originally prepared by Dr. M. F. Welsh and intended for presentation at the VIIIth International Botanical Congress, was also printed in the C.P.S. News.

Membership in the Society now stands at 196 as compared with 193 at this time last year. The election of 25 new members brings the total to 221. The election of Dr. W. F. Hanna as a Fellow of the Agricultural Institute of Canada is an honour richly deserved and here recorded with gratification.

The attached financial statement shows a favourable balance of $440.39, as compared with $416.45 last year.

Respectfully submitted,

A. J. Skolko,
Secretary-Treasurer.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1953 to May 31, 1954

Revenue:			
Balance brought forward			$416.45
Fees:			
1951-52	$ 9.00		
1952-53	31.00		
1953-54	291.00		
1954-55	50.00		
1955-56	2.00		
		$383.00	
Interest on bond		15.00	
Sale of Proceedings		3.98	
Proceeds of annual meeting		36.51	
			$438.49
			$854.94

Expenditures :

Printing of Proceedings No. 21	$222.18	
Printing of constitution and tickets	34.43	
Postage	42.08	
Stationery	114.13	
Bank charges and exchange	1.73	
		$414.55
Balance (on hand) May 31, 1954		$440.39

Additional Asset :

Dominion of Canada 3% Victory Bond (Series K8Z32643)	$500.00

Audited and found correct,

Mildred K. Nobles (sgd.)
D. S. MacLachlan

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

One hundred and thirty accessions to the library were received during the year 1953-54. These accessions were indexed and added to the library which now contains 691 items.

At the 1953 Meeting, the Custodian was instructed to prepare a recommendation as to the disposal of the library — the purpose of this disposal being to make the contents of the library more readily available than at present to members of the Society and others interested in plant pathology.

After some consideration, the following recommendation is submitted to this Meeting: (1) That the collection of reprints be maintained under the control of the Custodian of the Records of the Society. This collection should contain reprints of all papers published by members of the Society and others publishing on plant pathology in this country. (2) That all publications in the library other than reprints be turned over to the library of the Botany and Plant Pathology Division to be disposed of to the best advantage of that library and on the understanding that the librarian or library committee of the Division may use their discretion as to which publications are to be added to their library. Publications not considered useful could be passed on to the library of the Department of Agriculture, or disposed of as seems most suitable. (3) The records of the Society, including group photographs and photographs of distinguished members of the Society should be kept by the Custodian.

Finally, it is thought that some consideration should be given to finding the most suitable place for keeping the records of the Society which, for a number of years, have been kept at Winnipeg, Man. As Ottawa will likely remain the centre of activity in plant pathology in the future, as in the past, it is considered advisable that the custodianship of the records be transferred there eventually for permanent maintenance. At the moment, the present Custodian has no objection to location of the records at Winnipeg but it is, nevertheless, his opinion that Ottawa is the most suitable place for them and that they should be moved there when conditions become favourable for such a move.

T. Johnson.

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the Twentieth Session of the Canadian Phytopathological Society were issued on November 1, 1953. They contain the report of the meeting held at Saskatoon, Saskatchewan, June 22-25, 1953, a group photograph of those in attendance, twenty-five abstracts of papers read at the meeting, and a list of papers published by members of the Society between June 1, 1951 and May 31, 1953.

In spite of all efforts to have the Proceedings ready for distribution by the end of August following the meetings, as recommended in the report of the

editorial committee in the Proceedings of the Twentieth Session, it was not possible to issue them before November 1. This was due in part to the reluctance of members to send abstracts of papers presented at the meetings and lists of papers published to the Secretary and in part to delays encountered in having the copy typed.

To remove the former difficulties, the following recommendations are made by the committee. (1) Members presenting papers at the meetings be prepared to present an abstract of their papers to the Secretary before or during the meetings. (2) Members send a reference to the secretary of each paper published as it appears in publication. This should be typed on a 4 x 6 filing card and should include the information required in the following order: Author (Surname first), Title of Paper, Journal, Volume, Number, Paging, and Year.

If these two suggestions are carried out, it will greatly facilitate and hasten the publication of the proceedings so that the original time limit set might possibly be attained.

The work of the Secretary-Treasurer in preparing the material for the Proceedings is to be highly commended.

R. S. Willison
R. D. Tinline
A. J. Skolko
Ruth Horner (Chairman)

REPORT OF THE NOMINATING COMMITTEE

The following slate of officers is presented for election as members of the new Executive of the Canadian Phytopathological Society:

President:	W. C. Broadfoot
Vice-President:	W. F. Hanna
Secretary-Treasurer:	D. S. MacLachlan
Councillors:	E. Campagna
	P. M. Simmonds

Respectfully submitted,

G. H. Berkeley
H. R. McLarty
A. W. Henry
D. J. MacLeod
J. C. Perrault (chairman)

REPORT OF THE TERMINOLOGY COMMITTEE

Further study of the terminology of plant diseases caused by viruses was made during the year and all members were given an opportunity to suggest improvements. A report incorporating these suggestions and including a list of references was completed by Dr. M. F. Welsh.

A submission to the Section of Plant Pathology of the International Botanical Congress, to be presented at the 1954 Paris meeting by Dr. Welsh, was prepared. The aforementioned report on the "Terminology of Plant Virus Diseases" is to be attached to the submission to serve as a possible basis for the work of the Committee on Standardization of Technical Words of the Section of Plant Pathology of the International Botanical Congress. It is urged that this committee be asked to assemble a list of plant pathological terms and comments thereon and from this to prepare a report for publication. The submission also requests that the terms of reference and powers of this committee be clarified.

The circulation of a report on the "Terminology of Forest Pathology" prepared by Dr. D. C. Buckland has been delayed temporarily in order to permit checking the terms in it with those in the recent compilation, "British Commonwealth

Forest Terminology" issued in 1953 by the Empire Forestry Association. It is expected that this revision will be completed soon and that the report will then be made available.

Respectfully submitted,

D.C. Buckland
W.A.F. Hagborg
B.H. MacNeill
H.M. Good
T.C. Vanterpool
R.S. Willison
R.A. Ludwig
W.E. McKeen
C.D. McKeen
D.J. MacLeod
R. Pomerleau
L.E. Tyner
M.F. Welsh
A.N. Langford
A.W. Henry (Chairman)

REPORT OF THE COMMITTEE ON PLANT DISEASE DIAGNOSIS

The committee has examined a proposal made by the Head of the Biographic Unit, Ottawa, concerning establishment of a library of Kodachrome slides. Mr. Parker's statement is as follows:

"We have for some time been compiling a Central File of illustrative material which is available to all Services of the Department and there is no reason why this service could not be extended to the Canadian Phytopathological Society. Much of your material would doubtless be extremely useful if it could be incorporated in the Central File, and it was this possibility which aroused my interest last year.

"It is felt that the most favourable arrangement for all concerned would be to loan various selections of slides to the Society or University through the existing Central File. All material for slide preparation would be forwarded to me through one source, and at least two slides would be made of each subject to insure an adequate supply for loan purposes. As additions to this File warranted, lists of subjects would be circulated to the Society and others who might be interested. The Society would benefit from such an arrangement, as a complete service would be available for the preparation of slides and maintenance and operation of the library.

"Our services are extended without charge to individuals and laboratories within the Department. The same conditions would apply in this case as the operation of the slide library through the Central File would place the project on an official level.

"I would be prepared to begin work on any slides immediately if the above arrangement is satisfactory to you."

The members of the committee have studied this proposal and all have agreed that it would be a satisfactory arrangement for the Society. We recommend that the Society support the scheme and set up an organization to collect material for duplication.

Respectfully submitted,

G.B. Sanford
G.C. Chamberlain
D.J. McLeod
Frances C. Mellor
W.G. Benedict
W.E. Sackston
H.W. Mead (Chairman)

REPORT OF THE PUBLICATIONS COMMITTEE

In the minutes published in the Proceedings for 1952 and in the report of this committee in the Proceedings for 1953, will be found the incidents leading up to the creation of this committee.

The Canadian Society of Microbiologists sought our support in the establishment of a new journal by the National Research Council for the publication of papers in their field. The Canadian Journal of Microbiology is now a reality and its first number will appear in August. It will be the official organ of the microbiologists' society.

Your committee has considered the various suggestions that were proposed at the Saskatoon meeting last year. These were —

1. That the Society establish a journal of its own.
2. That the Canadian Journal of Botany be renamed as the Canadian Journal of Botany and Plant Pathology.
3. That the Proceedings of the Society be enlarged so that all or part of the papers presented at the annual meeting could be printed in full instead of in abstract form.
4. That the society publish a series of monographs.

It is obvious that, with the exception of the second one, the implementation of these suggestions will impose varying degrees of financial obligation on the membership.

The most ambitious of the suggestions is the first one — the publication of our own journal. Your committee has considered the cost involved, even in an issue of four copies a year, and also the editorial and other work which would have to be done on a voluntary and free-time basis. We do not consider that the society is in a position to undertake a programme of this magnitude at present or that the need of an additional outlet for plant pathological and mycological papers is great enough to warrant such an undertaking.

With regard to the suggested approach to the National Research Council to change the name of the Canadian Journal of Botany by adding "and Plant Pathology", we do not think that anything would be gained by such a change. It is realized that in recent years the concept of "Botany" has tended to become restricted to taxonomic and other phases of work on the higher plants. This is perhaps the basis of the suggested change, "Plant Pathology" being added to provide the additional scope. Unfortunately, by doing so, it would appear that mycology was to be excluded. This would be most unfortunate, because during the past two years as many or more pages in the Canadian Journal of Botany have been devoted to mycological papers as have been to plant pathological ones.

Your committee regards the third proposal as one that is more within our means and would add materially to the value of the Proceedings. It should not be mandatory that every paper read at the annual meeting had to be printed in full. In several instances the paper would be in the form of a progress report and the author might consider it unwise to publish his results at that point. Again, in the case of a paper reporting a completed piece of research, the author might feel that it should be published in a journal with a much larger circulation. We feel that this proposal could be adopted in a limited way, at least in the initial stages by selecting a few of the papers presented, particularly those dealing with more general topics, and printing these with the authors' consent.

The final suggestion with respect to monographs is worthy of consideration. Such publications would probably appear infrequently and might consist of compilations of knowledge on some field of plant pathology, cover the recent advances in some fairly wide field, or consist of original work that would be too extensive to be acceptable by the existing journals.

The publication of such monographs would be costly and a fairly large number would have to be printed. The distribution would be to the members of the society with or without a small charge and the remainder would have to be sold. To carry this out the society would have to build up a reserve fund to cover an investment of this kind and that would involve a material increase in the membership fee.

We have been advised that the A.I.C. will be discussing at this meeting the possibility of centralizing the publication of abstracts of papers presented at the annual meetings including those of the affiliated societies and that two representatives of this society will be in attendance.

In submitting these expressions of opinion for your consideration we are conscious of the fact that no serious difficulties have so far arisen in obtaining a

medium for the publication of papers prepared by the members of this society, but that does not mean that our society should not seriously consider some means of increasing its usefulness to its members and to the profession.

F.L. Drayton
G.H. Berkeley
W.F. Hanna (Chairman)

REPORT OF THE REPRESENTATIVE TO THE CANADIAN SOCIETY OF MICROBIOLOGISTS

The 1954 Annual Meeting of the Canadian Society of Microbiologists will be held at Queens University June 24-26. We therefore cannot have a report of their annual meeting at this time. There are, however, two items which should be mentioned.

The Canadian Society of Microbiologists has been approached by the International Association of Microbiological Societies to determine whether Canada would act as host for the 7th International Congress for Microbiology in September 1956. The Canadian Society is anxious to know what the Phytopathologists think of the proposal and whether they would be willing to co-operate should the Congress be invited to Canada.

The other item refers to the establishment of a Journal to be the official organ for publication of research in microbiology. It was considered such a journal would give greater national significance to the research and a better international distribution of publications.

The National Research Council of Canada has announced the publication of a Canadian Journal of Microbiology. The Journal will be issued every two months commencing in August 1954. The first volume only will consist of nine numbers i.e. August 1954 to December 1955. Thereafter volumes will coincide with the calendar year. Dr. R.G.E. Murray, London, has been appointed Editor. The subscription rate is $3.00 per year.

Respectfully submitted,

A.R. Walker.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas the Canadian Phytopathological Society has held its 21st Session at Macdonald College, June 21-24, 1954, in conjunction with the Annual Convention of the Agricultural Institute of Canada, and whereas the accommodations and facilities placed at the disposal of the Society have contributed notably to the success of the sessions;

Be it resolved that we extend our sincere appreciation to:

(1) Our hosts, the Macdonald College Branch of the Agricultural Institute of Canada.

(2) Dr. J.G. Coulson, Chairman, Program and Publicity Committee and members of his committee, for preparing the program and making arrangements for the annual dinner.

Be it resolved also that we extend our sincere appreciation to Dr. A.J. Skolko, retiring Secretary-Treasurer, for the services he has rendered during the six years he has devoted to the welfare of the Society.

Respectfully submitted

H.N. Racicot
A.A. Hildebrand
J.F. Hockey (Chairman)

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-FIRST MEETING OF CANADIAN PHYTOPATHOLOGICAL SOCIETY

CHLAMYDOSPORE GERMINATION IN TILLETIA BREVIFACIENS FISCHER

R.J. Baylis and R.E. MacKay, Botany & Plant Pathology Laboratory, Ottawa, Ontario.

The dwarf bunt disease of winter wheat in Ontario is known to be present in at least sixteen counties since it was first observed in 1947. Although the disease has been found in low amounts to date, its presence constitutes a major threat to an annual production of 700,000 acres of winter wheat in the province.

Chlamydospores from the 1953 collections were plated on water agar at temperatures between 0° and 15°C. Germination began after four to five weeks incubation and was found to be stimulated by daylight and artificial light of low intensity. Maximum percentage of germination under these conditions seldom exceeded sixty per cent. Germination in total darkness, when it occurred, never exceeded ten per cent at any temperature tested.

The optimum temperature for maximum germination of the Ontario collections of dwarf bunt spores is approximately 5°C.

STUDIES ON THE ASSOCIATION OF *RHIZOCTONIA SOLANI* AND NEMATODES IN A ROOTROT DISEASE COMPLEX OF WINTER WHEAT IN SOUTHWESTERN ONTARIO

W. G. Benedict and W. B. Mountain, Plant Pathology Laboratory, Harrow, Ontario.

In the spring of 1953 a destructive rootrot disease occurred in many fields of winter wheat in southwestern Ontario. In late May and early June prominent symptoms consisted of markedly yellowed and stunted patches of plants. Many plants were killed by the destruction of underground parts. Isolations made from affected plants consistently produced a strain of *Rhizoctonia solani* and nematodes of the genus *Pratylenchus*. Accordingly an interrelationship of these two organisms became evident in the course of the investigation of the disease. The relative importance of each organism was determined by several experiments utilizing different soil chemical treatments at different soil temperatures. When either the fungus alone or the nematode alone was eradicated there was still significant stunting of the plants over a wide temperature range. Eradication of both organisms from the infested soil resulted in an approximate 50% increase in growth of the wheat seedlings. At a temperature below 60°F. the nematode seemed to be more pathogenic than the fungus whereas at a temperature above 70°F. the fungus was more pathogenic than the nematode. The complete disease complex represented the effect of the fungus added to the effect of the nematode. The mechanism of infection is now under study utilizing wheat seedlings grown under aseptic conditions and inoculated with the pathogens concerned either separately or in combination.

THE INTERNAL MICROFLORA OF BUDS AND TWIGS

E.O. Callen, Macdonald College, Quebec.

Examination of forty-seven varieties of wild and cultivated shrubs and trees on the Macdonald College campus, has shown the presence of eleven fungi in the bud and twig tissues. In the bud, these fungi are found almost exclusively in, or on the bud scales, although *Pullularia pullulans* and *Alternaria* sp. are found in the tissues of the stem apex. In the twigs of the current season's growth, *Pullularia* and *Alternaria* have been isolated (either alone or together) from forty-two varieties of trees and shrubs. In ten of these, including McIntosh, Cortland and Siberian crab apple, cherry, plum, pear, red oak, Ginko, sugar and silver maple, observations were made over a period of from 6 - 9 months, and have shown that penetration of new growth is slow (silver maple) or rapid (cherry) according to the host plant and external conditions. Subsequent penetration into the leaf appears to be dependent on the host reaction and external factors to an even greater degree. As a result of the regular orchard spraying program, the activity of *Pullularia* has shown considerable reduction in the pear, as well as McIntosh and Cortland apples. Alternaria shows no such reduction.

A MODIFIED SOIL FOR THE STUDY OF FUNGAL ACTIVITY IN SOIL WITH SPECIAL REFERENCE TO *HELMINTHOSPORIUM SATIVUM*

S.H.F. Chinn, Plant Pathology Laboratory, Saskatoon, Saskatchewan.

A modified soil capable of demonstrating certain growth activity of fungi in soil is described. Essentially, the method consists of colonization of sterilized soil with representative cultures of bacteria and actinomycetes which were isolated from the soil prior to sterilization. A comparative study of modified, natural and sterilized soils where four species of fungi were used indicated similarities in behaviour of all the fungi in modified and natural soils but differences in sterlized soil.

A number of investigations using this soil are mentioned and other advantages are discussed.

HEAT INACTIVATION OF SOME STRAWBERRY AND RASPBERRY VIRUSES

R. E. Fitzpatrick, R. Stace-Smith, and F.C. Mellor, Plant Pathology Laboratory, Vancouver, British Columbia.

Growing virus-infected strawberry and raspberry plants at temperatures which fluctuated between 95°F and 105°F for 9 to 11 days killed most of the green foliage and in many cases the entire plant. However, among those plants that survived were some that had apparently been completely freed of virus. The plants were grown in pots. For treatment they were placed in a heated box with a glass top. The plants were watered with water at the same temperature as that of the box. *Fragaria vesca* infected with a mottle, leaf tattering virus, and red raspberry of the Cuthbert variety infected with mild mosaic, have responded to this treatment.

STUDIES ON HEARTWOOD FORMATION AND STAINING IN SUGAR MAPLE — *ACER SACCHARUM* MARSH

H. M. Good, P.M. Murray, and H. M. Dale, Queens University, Kingston, Ontario.

If the term Heartwood be used to designate the older portion of a woody stem in which all cells have died, the term cannot be applied readily to Sugar Maple wood in which some cells may live more than a century.

When death does occur amber deposits are left in the parenchyma cells which give the wood a deeper colour. The amber colouring appears to be a very weak manifestation of the wound gum reaction by which parenchyma cells in younger wood produce, when injured, substantial post mortem deposits of dark brown material. Such material is formed regularly in association with infection by rot fungi. It may be formed also by a variety of inorganic toxic substances and by injuries which do not result in infection.

Stained wood has properties remarkably different from those of normal wood or from the slightly darkened heart wood. Stained wood is harder, contains more water, has up to 15 times the normal mineral content and is distinctly alkaline. The alkaline reaction is apparently due directly to the content of calcium and potassium salts which appear to accumulate following wound gum formation. The effects of this increase in mineral content and pH on disease development are thought to be considerable.

EFFECT OF HIGH TEMPERATURE ON THE REACTION OF ADULT WHEAT PLANTS TO STEM RUST

G.J. Green and T. Johnson, Plant Pathology Laboratory, Winnipeg, Manitoba.

Ten wheat varieties were tested in the adult stage at low (about 60°F) and high (about 80°F) temperatures for their reaction to stem rust races 11, 12, 15A, 15B-1, 15B-2, 15B-3, 17A, 29, 29A, and 139. Three of these races, 15B-3 discovered in 1952, and 12 and 29A in 1953, are of significance because of high virulence to McMurachy and moderate virulence to the new wheat Selkirk. Race 29A is of further interest because of its pathogenicity to Kentana and K.58. In the low and high

temperature tests, the stability of varietal reaction depended on the race-host combination. Thus, McMurachy was resistant to races 15B-1 and 15B-2 at the low and susceptible at the high temperature, whereas it was resistant at both temperatures to the other races except 12, 15B-3, 29A, and 139 which could attack it at both temperatures. Selkirk resembled its parent, McMurachy, in its reaction to race 12, the three biotypes of race 15B, and 29A, but was resistant at both temperatures to race 139, a characteristic inherited from its other parent, Redman. Only two of the wheats tested, K.338 AC.2E.2, and K.117A, were highly resistant to all races at both temperatures.

THE EFFECT OF DIHYDROSTREPTOMYCIN SULPHATE ON *PHYTOPHTHORA INFESTANS* (MONT.) DE BARY

W.A. Hodgson, Plant Pathology Laboratory, Fredericton, New Brunswick.

The growth of *Phytophthora infestans* in artificial media was found to be completely inhibited by dihydrostreptomycin sulphate at a concentration of approximately 30 p.p.m. The application of a solution of the antibiotic to the stems and leaves of potato plants resulted in a marked reduction in infection by this fungus.

THE NATURE OF THE FUNGICIDAL ACTION OF THE METALLIC ETHYLENEBISDITHIOCARBAMATES

R.A. Ludwig and G.D. Thorn, Science Service Laboratory, London, Ontario.

Zinc and manganese ethylenebisdithiocarbamate have been shown to be converted on aeration to ethylene thiuram monosulfide. This compound has been previously described by the authors as the fungicidal principal of the parent nabam.

REACTION OF MOIST WHEAT SEED TO TREATMENT AND STORAGE

J.E. Machacek and H.A.H. Wallace, Plant Pathology Laboratory, Winnipeg, Manitoba.

Studies under laboratory and greenhouse conditions have indicated that, in general, several factors affect the amount of injury from a phytotoxic seed dressing to the seed. The major factor appears to be the composition of the seed dressing, followed by period of exposure to the treatment, and moisture content of the seed. In the tests made thus far, the temperature at which treated seed was held and the degree of aeration given it following treatment seemed of little importance. The effect of the amount of mechanical injury needs further study.

Seed dressings containing gamma benzene hexachloride appear to be considerably more phytotoxic than dressings containing organic mercurials alone. The injury observed was much more pronounced when a test of germination was made on moist blotters, or moist paper in Petri dishes, than when the seed was sown in moist soil. Only a trace of injury occurred when seed treated with dressings containing BHC was sown in various combinations of air-dry clay-soil and sand. Treated seed exposed to dry soil for a few minutes and then transferred to moist paper in Petri dishes produced a high proportion of injured seedlings, but, when it was exposed to dry soil for a week and then germinated, no injury could be found.

The degree of mouldiness in stored wheat seed was found to be affected by the moisture content of the grain, and by the duration and temperature of storage. Seed of high moisture when stored at room temperature became mouldy very quickly. Mouldy seed failed to germinate and the development of mould could not be prevented by seed treatment.

A SURVEY OF THE VIRUSES OF THE FIELD TOMATO

B.H. MacNeill, Ontario Agricultural College, Guelph, Ontario.

A survey in the seasons of 1953 and 1954 of the commercial field tomato plantings in Ontario has revealed that virus diseases are widely distributed and in many cases are severely limiting to production in the crop. Samples taken from tomato seedlings in flats, from foliage in the field, and from fruit and foliage at harvest time were

checked for virus content by mechanical inoculation to differential hosts in the greenhouse. The viruses identified fell into the following groups in order of the frequency of their occurrence: Tobacco mosaic; Double virus streak (TMV plus Potato Y); Single virus streak; Etch; Potato X; Cucumber mosaic; Potato Y plus TMV; and Tomato spotted wilt. Certain weeds commonly occurring in tomato plantings were found to serve as virus reservoirs.

A VIRUS INHIBITOR IN *CAPSICUM FRUTESCENS* L.

C.D. McKeen, Plant Pathology Laboratory, Harrow, Ontario.

Juice expressed from sweet pepper plants systemically infected with cucumber mosaic virus was found to produce only a few lesions when rubbed on the leaves of two local lesion indicator hosts, Cowpea and *Chenopodium hybridum* L. In contrast, expressed juice from burley and Turkish tobacco infected with the same virus produced large numbers of local lesions on both hosts. The addition of a few drops of extract from pepper to the infective juice from tobacco has consistently reduced its infectivity to a low level, as indicated by local lesion assays. These results have been interpreted to mean that the pepper plant contains a substance that inhibits local lesion production on Cowpea and *C. hybridum*.. Tests with other viruses have shown that the inhibitive response is produced only on certain hosts and from the results obtained it appears that the host is determinative so far as the presence or absence of the inhibitive response is concerned. Although the inhibitor is present in all parts of the pepper plant, extracts from leaves and corolla are most inhibitive. The inhibitor is thermolabile, and its inhibitive power is appreciably reduced by a 10 minute exposure at 80°C and is completely inactivated at 100°C.

BLOSSOM AND TWIG BLIGHT OF PEAR CAUSED BY *PSEUDOMONAS SYRINGAE*

W.E. McKeen, Plant Pathology Laboratory, Saanichton, British Columbia.

During the spring of 1953, an epiphytotic of blossom and twig blight of pear occurred on Vancouver Island, and on some trees there was a complete destruction of all blossoms, necrosis of buds and twigs, and even a few small trees succumbed. Infection usually took place through the blossoms and buds but, later in the season, some fruit was attacked. In the flower, minute dark spots or bands on the receptacle were observed first. The spots rapidly increased in size, became black and enlarged until the receptacle, pedicel, and even the whole truss was withered. From the base of the truss, brown discoloured areas in the cambium and phloem extended down the twig for one or two inches and cankers formed as a result. Leaves distal to discoloured cambium and phloem areas after a few weeks were curled, dwarfed, and assumed an abnormal colour. Although the cankers did not develop during the summer, they enlarged considerably during the winter season. This disease has been confused with fire blight, boron deficiency, blossom wilt, and by the presence of secondary organisms, but *Pseudomonas syringae* is the causal organism.

MICROFLORA ASSOCIATED WITH CROWN AND ROOT ROTS OF RED CLOVER

O.A. Olsen, Macdonald College, Quebec.

Progressive loss of vigor and dying back of crown shoots of red clover is prevalent during the early summer of the second growing season. Vascular and central portions of crowns and roots exhibit discoloration and decay. Isolations of fungi from infected plants yield several species of *Fusarium,* also *Rhizoctonia, Phoma, Alternaria,* and others. Mixtures of fungi are invariably found in a diseased plant. Bacteria and nematodes are also frequently isolated.

BOTRYTIS LEAF SPOT AND TIP WILT OF ONIONS AND ITS CONTROL

O.T. Page, Ontario Agricultural College, Guelph, Ontario.

A foliage disease of bulb onions, characterized by circular to elliptical grayish-white dessicated spots and tip wilting of the green leaves, was observed on the Holland-Bradford Marsh during the growing seasons 1952 and 1953. Isolations from

the diseased tissue consistently yielded *Botrytis squamosa* Walker. In view of the fact that certain other *Botrytis* spp. may also cause spotting and wilting of onion foliage, the descriptive and inclusive name, Botrytis leaf spot and tip wilt is proposed for this syndrome. The term "blast" frequently used to describe certain leaf blotch and wilt symptoms, would be retained for symptoms of a physiogenic nature.

Tests of certain foliar sprays in the field control of Botrytis leaf spot were conducted on the Holland-Bradford Marsh during 1952 and 1953. Yields of Early Yellow Globe onions sprayed at weekly intervals with either Manzate, Parzate or Vancide were significantly greater than yields of onions sprayed with non-fungicides such as, Nu-Z, Nu-M, or DDT.

EFFECTS OF APPLE LEAF EXTRACT, YEAST EXTRACT, AND TWEEN 80 ON THE VEGETATIVE GROWTH OF *VENTURIA INAEQUALIS*, IN VITRO

Réal L. Pelletier, Macdonald College, Quebec.

Venturia inaequalis was grown in shake-flask cultures on a basal medium to which was added separately and in combinations apple leaf extract, yeast extract, and Tween 80 (polyoxyethylene sorbitan monooleate). The basal medium contained glucose, casein hydrolysate, inorganic salts, trace elements, and 10 water soluble vitamins. The dry weight of mycelium was taken as a measure of growth.

Growth, especially in its early phases, was considerably stimulated by hot water extracts of apple leaves harvested in the fall on the floor of unsprayed orchards. Apple leaf extract (ALE) was not replaced by yeast extract, Tween 80, yeast nucleic acid, adenine, guanine, hypoxanthine, thymine, uracil, xanthine, and cytosine. Growth was stimulated also by Tween 80. However, the maximum economic coefficient observed for Tween 80 was 10 as compared to 149 for ALE. The largest weight of mycelium was obtained with a medium containing a mixture of ALE and Tween 80. The yield in this case was twice the maximum obtained with ALE and Tween 80 added separately, and 40 times that with the basal medium alone. Tween 80 at the highest concentration used (10 g/1) inhibited growth in the presence of low ALE concentrations, but stimulated it in the presence of high ALE concentrations. Yeast extract (0.5 g/1) increased the rate of growth only slightly. At 2 g/1, yeast extract inhibited growth in media either with or without ALE and Tween 80.

Preliminary experiments indicate that Tween 80 is not replaced by Tween 20 (polyoxyethlene sorbitan monolaurate), Tween 60 (polyoxyethylene sorbitan monostearate), and Tergitol (a sulfonate wetting agent). There are indications that tea leaf extract can replace apple leaf extract. Also, that the growth stimulatory factor in ALE is heat stable, since the activity of ALE is not appreciably changed by autoclaving at 15 pound steam pressure for 1 hour at pH 1, 5, and 11.

It is concluded that ALE, yeast extract, and Tween 80 contain different growth stimulatory factors for which *V. inaequalis* is partially deficient. The ALE factor is apparently not one of the better known growth substances.

A BOTRYTIS ROOT ROT OF LETTUCE

J.A. Pires, Ontario Agricultural College, Guelph, Ontario.

A *Botrytis* of the *cinerea* type isolated from lettuce roots showing root rot symptoms has proved to be pathogenic in infection studies. In the field, symptoms progress from a discolouration of root tips, to a severe necrosis of roots until finally only a deeply furrowed, discoloured stump of a tap root remains. Under experimental conditions, the isolate induces a damping-off of seedlings and a slow rot of the roots of more mature plants. Other *Botrytis* isolates of the *cinerea* type obtained from lettuce foliage, as well as other species of *Botrytis* isolated from various sources, proved non-pathogenic to lettuce roots. The pathogen penetrates near the newly differentiated portions of the root and shows a marked action in advance, but does not colonize deeply until the innermost cortical cells begin to disintegrate. Its aggressiveness is somewhat influenced by temperature and greatly modified by the presence of certain other fungi in the soil.

A STUDY OF THE RELATIVE VIGOUR OF HEALTHY BARLEY SEED AND THAT OF SEED INFECTED WITH *USTILAGO NUDA*

R.C. Russell, Plant Pathology Laboratory, Saskatoon, Saskatchewan.

The relative vigour of barley seed with healthy embryos and seed with embryos infected with loose smut (*Ustilago nuda)* has been investigated. Experiments designed to compare the percentage of loose smut as determined by the embryo test, with the percentage of smut as determined by a growth test, indicate that the infected embryos usually germinate and produce smutted plants. Usually when healthy and diseased seed is sown deeply a larger proportion of the healthy seeds than diseased seeds produce plants.

A number of experiments conducted in the greenhouse have shown that it is possible, by the use of certain seed treatments, to cure at least a considerable proportion of the infected embryos so that they will germinate and produce healthy plants.

After considering the evidence derived from several lines of experiment it is concluded that infected embryos are somewhat weaker than smut-free embryos, on the average, but the difference is not great.

CERCOSPORELLA FOOT ROT OR EYESPOT OF WHEAT IN NEW YORK STATE

R.A. Shoemaker and L.J. Tyler, Cornell University, Ithaca, New York.

Cercosporella herpotrichoides Fron. was isolated from elliptical lesions at the base of the culms of winter wheat grown near Ithaca, N.Y. Small discs of *C. herpotrichoides* mycelium on agar suspended over water in Petri dishes produced conidia when placed outdoors. Wheat diseased with eyespot was obtained from Washington state. *C. herpotrichoides* was isolated from the Washington material and compared with the New York isolate. No constant differences in cultural characteristics or morphology were found between the Washington and New York isolates. The New York isolate produced eyespot on three varieties of winter wheat and one variety of oats in greenhouse experiments. The lesions produced at the base of culms were elliptical with a distinct brown margin. On the surface of the culm lesion there was an extensive stroma which appeared to serve as an appressorium and was made up of polygonal brown fungous cells. Similar lesions and appressoria occurred on the material from Washington. Cultural experiments performed so far, with single ascospore isolations of *Leptosphaeria herpotrichoides* De Not. found on eyespot lesions, indicated that this fungus is not the perfect stage of *C. herpotrichoides.*

THE INFECTION OF CROWN ROOTS OF WHEAT IN STUDIES OF COMMON ROOTROT

P.M. Simmonds, Plant Pathology Laboratory, Saskatoon, Saskatchewan.

The results of investigations conducted in Saskatchewan show that much, if not most, primary infection originates from conidia or mycelial fragments on, or in, the surface soil. *Helminthosporium sativum* has been the most frequently observed pathogen although *Fusarium culmorum* and related species are commonly found. Observations through the season reveal lesions on the coleoptile, near the soil surface, in June, then lesions appear on the bases of leaf sheaths, through July, until finally most of the external tissues of the crown may be involved. Crown roots become established through June and July and frequently become infected as they break through the tissues of leaf sheaths at the lower nodes. Preliminary histological studies have shown that severe lesions at the base of the crown roots are prevalent.

ACERIA TULIPAE KEIFER IN RELATION TO THE WHEAT STREAK MOSAIC PROBLEM

J.T. Slykhuis, Science Service Laboratory, Lethbridge, Alberta.

The eriophyid mite, *Aceria tulipae* Keifer, carried the manually transmissible wheat streak mosaic virus and, in addition, a non-manually transmitted factor causing chlorosis, necrosis, and stunting of wheat.

When reared on diseased wheat, all stages of *A. tulipae* except the eggs carry the streak mosaic virus. There is evidence that only the nymphal stages can acquire the virus. Mites can remain infective on an immune host for at least six days.

Although *A. tulipae* transmitted the wheat streak mosaic virus to a number of wild as well as cultivated grasses in addition to wheat, the mites could be reared on only a few of the species tested. *A. tulipae* was found in nature on *Hordeum jubatum* L., *Agropyron smithii* Rydb., and *Elymus canadensis* L., but attempts to rear mites from these grasses on wheat were unsuccessful.

The survival of mites on wheat leaves buried in, or left on, the surface of soil was influenced by soil moisture and temperature which affected the rate of desiccation or decomposition of the leaves. In some instances mites survived long enough on infected leaves to infest and induce mosaic in wheat sown in the same soil up to six days later.

A NEW SEEDLING DISEASE OF RED CLOVER CAUSED BY *PYTHIUM ULTIMUM* TROW.

A.E. Straby, Plant Protection Division, Guelph, and B.H. MacNeill, Ontario Agricultural College, Guelph, Ontario.

Pythium ultimum Trow. was found to be the main cause of poor seedling stands of Red Clover on the sandy soils of Simcoe county, Ontario.

The developmental stages between the germination of the seed and the production of laterals by the radicle, appear to be the only ones during which infection may occur. The browned, burnt appearance of the radicle, and the presence of lesions on the cotyledons are the main symptoms of the disease. The latter symptom is an important diagnostic feature of the disease in the field. Infected seedlings may collapse quickly or first pass through a short period during which they become stunted and very turgid.

Studies upon host-parasite relationships have shown that red clover seed may become infected as early as 12 hours after seeding. The young seedling is usually attacked in the zone between the root tip and the lower root hair region, and becomes rapidly colonized intra-cellularly throughout the entire cortical tissue.

Leytosan P applied as a seed protectant proved to be effective against attack by *Pythium ultimum*.

PHYSIOLOGICAL SPECIALIZATION IN *ASCOCHYTA PISI* LIB.

V.R. Wallen and A.J. Skolko, Botany and Plant Pathology Laboratory, Ottawa, Ont.

A standardized procedure of testing the pathogenicity of *Ascochyta pisi* isolates on seedlings of pea varieties under greenhouse conditions has been adopted. By this method and with a differential host list including the pea varieties Wisconsin Early Sweet, Arthur, Early Blue, Engress, Kelvedon Wonder, Profusion, Smallton, and Valley, it has been possible to distinguish four forms or races of *A. pisi*. Sixty-two isolates, representing collections from Prince Edward Island, Quebec, Ontario, Manitoba, Saskatchewan, and Alberta, were identified. Form 1 appears to be prevalent in western Ontario, forms 2 and 3 the dominant form in the Ottawa region, and form 4 was found in the eastern provinces and Manitoba.

PECTIN METHYL ESTERASE FROM *CLADOSPORIUM HERBARUM* (PERS.) LINK. ITS PRODUCTION AND PROPERTIES.

E.R. Waygood, and Lucia Kapica, McGill University, Montreal, Quebec.

An adaptive extracellular pectin methyl esterase is produced by *C. herbarum* when growing on pectin. Maximum production occurs between the 2nd and 3rd week under our experimental conditions. The enzyme is completely inactive in the absence of divalent cations, calcium being the most effective activator. Depending on the age of the culture, partial or complete inactivation of the enzyme occurs

during purification by alcohol precipitation. Addition of pectin at a concentration of 0.14% to filtrates from older cultures prior to alcohol precipitation prevents this irreversible inactivation. It is suggested that the protective effect of pectin on the enzyme is due to its effect on the phosphate balance of the enzyme during purification.

THE EFFECT OF PLANT GROWTH REGULATING SUBSTANCES ON THE PRODUCTION OF PECTIN ESTERASE BY *CLADOSPORIUM HERBARUM* (PERS.) LINK

E.R. Waygood, Lucia Kapica, and J. Mozie, McGill University, Montreal, Quebec.

The mycelial growth of *C. herbarum* on pectin substrate is stimulated by low and inhibited by high concentrations of indoleactic acid (IAA). More marked is the response pattern of its extra-cellular pectin methyl esterase which is stimulated at a concentration of 10^{-5}M and inhibited at 10^{-3}M IAA. No inhibition occurs on sucrose substrate within this concentration range. The specific response on pectin substrate is probably dependent to a large extent on temperature conditions and the fungal strain. Synthetic plant growth substances viz. 2,4-D; NAA; IPA; and 2,4,5,T stimulate and inhibit growth, and production of this enzyme on pectin within a narrower concentration range.

ZINC DEFICIENCY IN FRUIT TREES IN THE OKANAGAN VALLEY

C.G. Woodbridge, Plant Pathology Laboratory, Summerland, British Columbia.

In the Okanagan Valley in British Columbia a zinc deficiency was found to occur on most commercial types of fruit trees. The severity of the deficiency varied considerably from orchard to orchard. In some, the severity was very marked and death of some tissues had occurred. In others, the deficiency was moderate and some or all of the characteristic symptoms usually associated with it, viz. small leaves, leaf rosettes, and an interveinal chlorotic pattern, were present. When the deficiency was slight, one or more of these symptoms were recognizable only at certain times of the growing season. With the exception of cherry, affected trees responded well to zinc sulphate sprays when applied during the late dormant period. Summer sprays of zinc oxide and the injection of various zinc compounds into the trunks of affected trees were less effective. A good correlation between the zinc content of tissues and the presence of deficiency symptoms was established. On apple, for example, the zinc content of leaves exhibiting symptoms varied from 2.0 to 12.8 p.p.m. and that of healthy leaves varied from 9.6 to 29.4 p.p.m.

INFECTION STUDIES IN *SEPTORIA GLYCINES* HEMMI

Harry Zalasky, Ontario Agricultural College, Guelph, Ontario.

The infection of the soy bean by *Septoria glycines* Hemmi has been investigated. Penetration of the host was found to be stomatal; subsequent spread of the pathogen was intercellular in the mesophyll tissue and in the parenchyma sheath and phloem of the leaf veins. Pycnidia formed both meristogenously and symphogenously, and were found in the leaf and pericarp, as well as in the seed coat. Colonization of the tissue of the pericarp and of the seed was primarily intercellular, although intracellular hyphae were found in the sclerenchyma cells of the subhylum region of the seed, and of the pod wall. Structurally, there exists no barrier to the invasion of the seed via the placenta and funiculus.

These studies leave no doubt that *S. glycines* is truly seed-borne in the soy bean.

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